

SCIENTIFIC RESULTS FROM THE MAMMAL SURVEY.

No. XIX.

A SYNOPSIS OF THE GROUPS OF TRUE MICE FOUND WITHIN
THE INDIAN EMPIRE.

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At the request of Mr. Wroughton, with a view to the preparation of his "Summary," I have made an attempt to find out the natural relationships to each other of the many forms of "*Mus*" that have been described from the Indian Empire, and now venture to submit, with some diffidence, the following synopsis of these most difficult animals.

As will be seen, it is very far from being a complete working out of the species, but at least it sorts them into their natural groups, and so makes a step towards their further elucidation.

The characters given in the synopsis are of necessity not such as can be used by sportsmen in the field, being mainly based on the skulls, of which some technical knowledge is needed—but this is a fault which is inherent in all such work.

Synopsis.

- A. Muzzle short—distance from gnathion to front bottom corner of zygomatic plate not, or barely, exceeding breadth across molars. (True House Mice.)
- a*¹. Tail about as long as head and body.
- a*². Colour some tone of grey or brown(1) *musculus* group.*
- b*². Colour more or less sandy, with white belly(2) *bactrianus* group.†
- b*¹. Tail much shorter than head and body—colour sandy(3) *pachyercus*.‡
- B. Muzzle normal—the distance above defined decidedly greater than breadth across the molars. (Field-Mice.)

* Includes, of Indian species, *dubius*, *homourus* and *urbanus*, (1845), *aquicaudalis* (1851), *manei* (1852), *tytleri* (1859), *kakhyensis* and *viculorum* (1878).

† Includes *gerbillinus* and *theobaldi* (1853). Although provisionally put as a "group" there is little doubt that *bactrianus* will prove to grade into *musculus* through such forms as *Mus musculus gentilis* of N. Africa, Arabia, &c.

‡ Not strictly Indian having been described from Yarkand. Probably it is synonymous with *M. wagneri*.

- a*¹. Supraorbital edges quite without any thickening; incisors generally bent backwards (opisthodont).
- a*². Size larger; brain-case rounded, its breadth more than 10mm; palatal foramina penetrating less between molars.
- a*². Palatal foramina very short, not reaching at all between molars (Sikkim)(4) *pahari*.
- b*³. Palatal foramina longer, reaching just between the front part of *m*¹ ...
- a*⁴. Colour very dark coppery; underside scarcely lighter, washed with ochraceous. (South India) ... (5) *famulus*.
- b*⁵. Colour normal, brown; underside lighter, greyish white. (Burma)..(6) *cookii*.
- b*². Size smaller, often very small, braincase narrow (less than 10mm broad), not specially rounded. Palatal foramina penetrating far between molars(7) *booduga* group¶.
- b*¹. Supraorbital edges thickened in old age; incisors about upright (orthodont). (S. Burma) ... (8) *nitidulus*.

But further, since the above synopsis was prepared without any thought of a generic split among the mice, and its primary division comes exactly between the House-mice and the Field-mice, the question again arises as to the possibility of re-establishing the

¶ Includes *booduga* (1837), *lepidus* (1839), *cervicolor* and *strophiatius* (1845) *terricolor* (1851), *darjilingensis* (1851), *fulvidiventris* and *albidiventris* (1852) *cunicularis* (1855), *beavani* (1866), and *dunni* (1912). The position of *cervicolor* has long been in doubt, but the study both of the type and of authentic specimens sent by Hodgson, in spirit, shows that it is a large and rather long-eared species of the present group. And *M. darjilingensis* is also the same species and not a member of the *musculus-rubius* group, as has been supposed.

genus *Leggada*, which was used for a number of years as valid, and then more recently (Miller, Mamm. W., Europe, p. 863, 1912) united with *Mus*.

I have therefore again examined all the pertinent African species to see how far the natural grouping corresponds with that of the Indian ones, and if so whether the groups can be defined satisfactorily.

The geography of the case has first to be considered. For in the East all the true native Indian forms come under B, those falling under A being either the artificially transported and parasitic *musculus*, or else Palearctic in locality. Should we therefore find that in the west those corresponding to A were again Palearctic and those to B Ethiopian, the case for separation would be greatly strengthened.

And this is exactly what we do find. The short-muzzled, *musculus-like* forms range over the whole of Europe, are found in North Africa and in Egypt, along the Nile as far south as Khartoum, but beyond that are not found in any part of Africa, the Ethiopian forms being all of the B type.

We thus find that the A group is by nature Palearctic only, a more or less artificial extension of it southwards to Khartoum in Africa and over all India being effected by the parasitic habits of *Mus musculus* itself, just in the regions of the ancient civilizations of Egypt and India. And on the other hand the B group is Ethiopian and Oriental, not penetrating at all into the Palearctic.

This seems to indicate that the groups A and B, or to call them now by their technical names, *Mus* and *Leggada*, are really distinct natural groups which it would be both convenient and true to nature to recognise as separate.

The essential characteristic of *Mus*, as compared with *Leggada* is the shortening of the muzzle, a shortening which is emphasised by a somewhat more forward position of the anterior zygoma-root. Looking at the skull from below the whole zygomatic plate is pushed forward, so that its anterior edge comes opposite a point in front of the middle of the palatal foramina while in *Leggada* it is at or even behind the middle. The length of the nasals in *Mus* is generally about equal to the distance from the external edge of one tooth-row to the outer side of the zygoma of the opposite side, or (perhaps a better comparison) to the distance between the lips of the auditory meatus of the two sides. In *Leggada* the nasal length generally decidedly surpasses these two distances. Not only is the muzzle of *Mus* shorter, but it is a little broader, so that the distance between the two anteorbital fossæ goes less than three times in the nasal length, in *Leggada* more than three times.

Every individual skull will not always answer to each of these tests, but on the whole there is rarely a case where one is doubtful as to which of the two groups a species should be placed in.

The most doubtful are the short-tailed mice known as *algirus* and *spicilegus*, which more approach *Leggada* and have less of the *musculus* specialization. But on the whole they are best referred to *Mus*, in whose geographical area they occur.

To *Mus* therefore I would refer the following, with their sub-species, viz.:—

<i>musculus</i> , L.	<i>bactrianus</i> , Bly.	<i>wagneri</i> , Eversm.
<i>firoensis</i> , Clarke.	<i>gentilis</i> , Brants.	<i>muralis</i> , B-Ham.
<i>algirus</i> , Loche.	<i>spicilegus</i> , Pet.	

Leggada would then include:—

<i>pahari</i> , Thos.	<i>famulus</i> , Bonh.	<i>cookii</i> , Ryl.
<i>booduya</i> , Gray		
(genotype).	<i>nitidulus</i> , Bly.	

and in addition the whole of the African species referred formerly to *Leggada* (*minutoides*, *pasha*, &c., &c.) and in recent years by Miller, Heller and Dollman, to *Mus*.

The following new forms may be conveniently described here:—

Leggada nitidula popaea, subsp. n.

Size rather greater than in true Pegu *nitidula*; colour rather paler, the posterior back without the distinctly darker median area usually present in that animal. General colour above rather darker than "drab." Below pale gray, the hairs slaty basally, greyish white terminally; line of demarcation on sides not very sharply defined, often faintly edged with buffy chin hairs white to base. Tail averaging longer than in true *nitidula*, its length measured as 75, 75.5, 78.5, 79, 80mm, in six specimens as compared with a range of 64 to 73mm in eight specimens of *nitidula*; blackish above, white below, the contrast more marked than in *nitidula*. Mammæ 3—2=10 as usual.

Skull essentially similar to that of *nitidula*, but the tendency to a postorbital thickening or projection perceptible in *nitidula* is more strongly marked, the projection amounting, in old specimens, to heavy thickened ridges, which therefore contradict the formal rule that there are no such ridges in the present group. They are, however, quite short and do not extent back on to the parietals. Palatal foramina extending well between the first luminæ of m. Incisors as in *nitidula* more thrown forward, or (rather) less turned backwards, than usual, being about "orthodont" with indices 77° to 86°, most of the species having this index below 75° (opisthodont).*

* Cf. Ann. Mag. N. H. (9) I, p. 35 (footnote) 1918.

Dimensions of the type, measured in the flesh:—Head and body 99mm; tail 78·5; hindfoot 17; ear 13. Skull, greatest length 24·2; condylo-incisive length 23·5; zygomatic breadth 12; nasals 9; interorbital breadth 3·7; palatilar length 12·2; palatal foramina 5·5; upper molar series 3·9.

Hab.:—Mt. Popa, Dry Zone of Burma.

Type:—Old male. B. M. No. 14, 7, 19, 200. Original number 3917. Collected 29th September 1913 by G. C. Shortridge. Presented by the Bombay Natural History Society. Seven specimens.

Mus gentilibus, sp. n.

A small species of restricted *Mus*, about the size of *M. spicilegus*, but with the comparatively long tail of *Mus musculus* and *gentilis*.

Size small, form slender. General colour as in *M. gentilis*, the upper surface sandy fawn, the posterior back warmer, under-surface white, the hairs white to the roots in the type, but slaty at base in another specimen, and in yet another, they are slaty basally and washed terminally with dull buffy, as in the house haunting *Mus musculus*. Ears, of moderate size. Hands and feet white. Tail, of about the length of the head and body, varying from a little shorter to a little longer.

Skull, of about the size and shape of *M. spicilegus* or rather smaller; markedly smaller than that of *gentilis*.

Dimensions of the type, measured in the flesh:—Head and body, 65 mm; tail, 66; hindfoot, 15·5; ear, 12.

Skull:—Greatest length, 20·3; condylo-incisive length, 19; zygomatic breadth, 10·6; nasals, 8·6; interorbital breadth, 4; palatal foramina, 5; upper molar series, 3·3.

Hab.—Aden. Type from Lahej, other specimens from Sheikh Othman.

Type.—Adult male. B. M. No. 99, 11, 6, 71. Original number 37. Collected 23rd August 1899 by W. Dodson. Five specimens.

This little mouse is the *Mus bactrianus* of the first and the No. 23 of the second of my papers on Aden Mammals (P. Z. S., 1895 p. 554 and 1900, p. 103). Its small size suggests a *Leggala*, but it is clearly a true *Mus*, and seems most related to *M. gentilis*, from which it differs by its markedly smaller size. On the other hand, judging by the length of the tooth-row, it is larger than *M. abbotti*, Waterh., of Trebizond, as yet only known to us by the immature type specimen. From the members of the *spicilegus* group it is distinguished by its longer tail.